

CATALOG INFORMATION

Dept and Nbr: MACH 51B      Title: ADV MACHINE TOOL TECH  
Full Title: Advanced Machine Tool Technology  
Last Reviewed: 2/28/2022

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |       |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 2.00 | Lecture Scheduled     | 1.00 | 17.5         | Lecture Scheduled  | 17.50 |
| Minimum | 2.00 | Lab Scheduled         | 3.00 | 8            | Lab Scheduled      | 52.50 |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0     |
|         |      | Contact Total         | 4.00 |              | Contact Total      | 70.00 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0     |

Total Out of Class Hours: 35.00

Total Student Learning Hours: 105.00

Title 5 Category: AA Degree Applicable  
Grading: Grade Only  
Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP  
Also Listed As:  
Formerly:

**Catalog Description:**  
Advanced machining processes involving the use and care of lathe, mill, drill press, and common hand tools. Measurement, layout, and tolerance application processes relevant to industrial manufacturing.

**Prerequisites/Corequisites:**  
Course Completion of MACH 51.1A ( or MACH 51A)

**Recommended Preparation:**  
Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Advanced machining processes involving the use and care of lathe, mill, drill press, and common hand tools. Measurement, layout, and tolerance application processes relevant to industrial manufacturing. (Grade Only)  
Prerequisites/Corequisites: Course Completion of MACH 51.1A ( or MACH 51A)  
Recommended: Eligibility for ENGL 100 or ESL 100  
Limits on Enrollment:

Transfer Credit: CSU;  
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |                      |           |
|----------------------|----------------------|----------------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          | Effective:           | Inactive: |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | Effective:           | Inactive: |
| <b>IGETC:</b>        | <b>Transfer Area</b> | Effective:           | Inactive: |
| <b>CSU Transfer:</b> | Transferable         | Effective: Fall 1981 | Inactive: |
| <b>UC Transfer:</b>  |                      | Effective:           | Inactive: |

### **CID:**

### **Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Calculate speeds and feeds to machine of ferrous and non-ferrous metals.
2. Cut an internal thread and external thread.
3. Setup and cut and angle on a sine plate.
4. Complete precision layout and machining of a part according to blueprint tolerances and specifications on a vertical mill.

### **Objectives:**

Upon successful completion of this course, the student will be able to:

1. Safely operate a variety of machine tools without supervision.
2. Set up machines and produce machine parts independently.
3. Calculate speeds, feeds, and RPM (revolutions per minute) for machining various metals.
4. Perform precision layouts using metrology layout tools.
5. Calculate and cut tapers and angles.
6. Determine tolerances according to manufacturing standards.
7. Manufacture and "finish" a machined part according to blueprint specifications.
8. Identify and locate information in text manuals used in industry.
9. Demonstrate proper safety practices, procedures, and professionalism.

### **Topics and Scope:**

- I. Orientation and Safety
- II. Materials and Processes
  - A. Ferrous metals
  - B. Non-ferrous metals
- III. Material Calculation Formulas
  - A. Feeds
  - B. Speeds
  - C. RPM. (revolutions per minute)
- IV. Advanced Lathe Operations

- A. Cutting
  - 1. Tapers
  - 2. Angles
- B. Boring
- C. Work Holding Devices
- V. Tooling: Use, Care, and Identification
  - A. Types
  - B. Coolants
- IV. Metrology Layout Tools
  - A. Sine bar
  - B. Protractors
  - C. Gages
  - D. Optical alignment magnifier
- VI. Drill Press Operations
  - A. Tools
  - B. Proper set-up procedures
- VII. Cutting Tools
  - A. Types
  - B. Calculations
- VIII. Advance Mill Operations
  - A. Surface finish
  - B. Tolerances
  - C. Work Holding Devices
- IX. Geometric Dimensioning and Tolerances (G.D.& T.)
  - A. Tolerance applications
  - B. Allowances
  - C. Precise fitting
  - D. Manufacturing standards
- X. Industrial Text Manuals
  - A. "Machinery's Handbook" machinist reference handbook
  - B. Online research
- XI. Metrics
  - A. Application
  - B. Use of conversion tables used in industry
- XII. Professionalism
  - A. Safety
  - B. Production quality
  - C. Proper work habits

All topics are covered in the lecture and lab portions of the course.

### **Assignment:**

Lecture-related Assignments:

1. Readings in assigned text, approximately 15 to 20 pages per week
2. Quizzes (3 - 8) and safety and final exams

Lab-related Assignments:

1. Lab projects will be graded for skill demonstration and problem solving and may include:
  - a. Calculations of speeds and feeds
  - b. Cut taper, angles, and chamfers
  - c. Cut a taper and verify angles with a sine bar and dial indicator

- d. Cut internal threads on a lathe using a boring bar
  - e. Adherence to proper safety procedures
  - f. Written process procedures
2. Compile a notebook of lab notes, process plans, inspection sheets and handouts
  3. Organize workspace and clean up lab area

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Project preparation, process procedures, labnotes

Writing  
20 - 30%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab projects and lab notebook

Problem solving  
10 - 30%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab projects, demonstration of proper safety procedures

Skill Demonstrations  
20 - 35%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes and safety and final exams

Exams  
20 - 30%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Professionalism, participation, preparation, work habits

Other Category  
10 - 20%

### Representative Textbooks and Materials:

Precision Machining Technology 2nd ed. by Hoffman, Hopewell and Janes 2015  
Instructor prepared materials